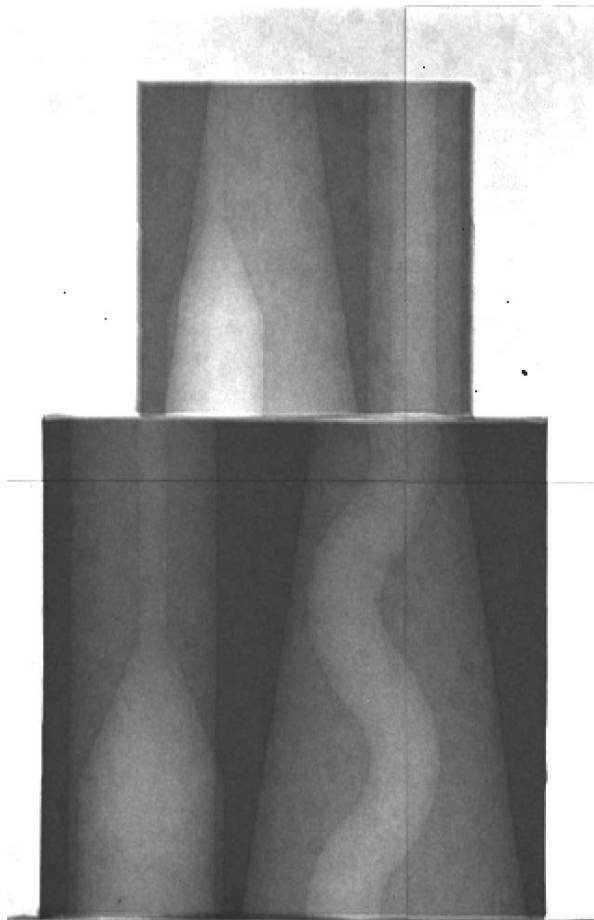


Neutron Imaging for Laser Selective Melting Inconel Hardware with Internal Passages

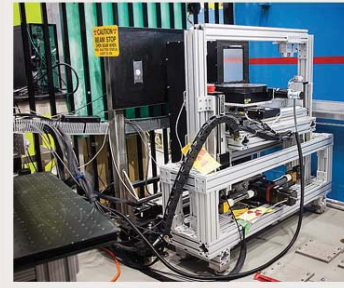
Dr. Terri L. Tramel (MSFC), Joseph K. Norwood (MSFC), Dr. Hassina Bilheux (ORNL)



unprocessed image with intensity/contrast adjustment

SPECIFICATIONS

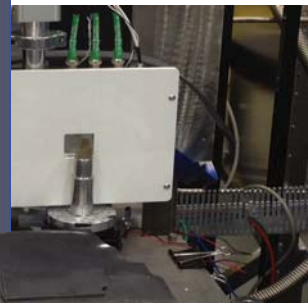
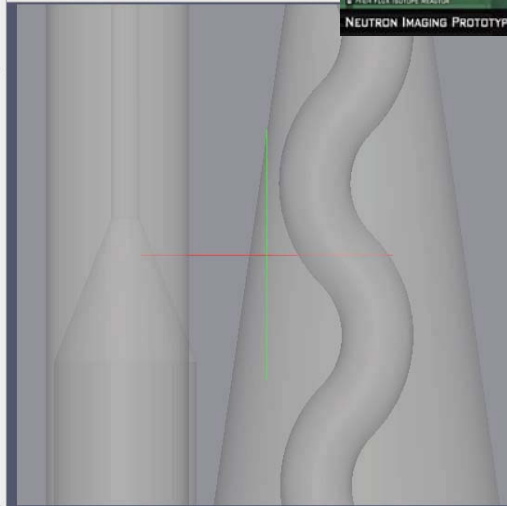
Wavelength	$1.8 < \lambda < 6 \text{ \AA}$
Wavelength resolution	$\Delta\lambda/\lambda \sim 10\%$
Highest spatial resolution	50 microns (FOV: $4 \times 4 \text{ cm}^2$) and 100 microns (FOV: $6 \times 6 \text{ cm}^2$)
Sample-to-detector distance	5 m
Detector	CCDs
Detector chip size	2048×2048 pixels
Detector resolution	5.2×5.2 (FOV: $4 \times 4 \text{ cm}^2$) and 13.4×13.4 (FOV: $6 \times 6 \text{ cm}^2$) microns ² pixels
Detector frame rate	1 fps (1 to 5 min required per image)



Neutron Radiograph (180° position) Build



Model (+Y view in ParaView)



Future Work:

Generate highest resolution (5 um) 3D reconstruction and overlay the reconstruction onto build model for absolute metrology comparison

0.4" block stacked on 0.6" block (Inconel 718) in the CG-1D Neutron Imaging Prototype Facility at Oak Ridge National Laboratory (ORNL) High Flux Isotope Reactor (HFIR)